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PESTS NOT KNOWN TO OCCUR IN THE UNITED STATES OR OF LIMITED
DISTRIBUTION, NO. 49: PLUM FRUIT MOTH

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Pest

PLUM FRUIT MOTH
Cydia funebrana (Treitschke)

Selected
Synonyms and
Combinations

Cydia prunana (Vallot)
Grapholita funebrana Treitschke
Laspeyresia funebrana (Treitschke)

Order: Family

Lepidoptera: Tortricidae

Economic
Importance

Cydia funebrana is an important pest of plums throughout northern Europe. The zone of heavy damage includes West Germany, where yield losses are considerable and reach 40-95 percent; Switzerland, where losses are 70 percent; Yugoslavia, where they are 41 percent; Bulgaria, where they are 60 percent; Romania, where the plum fruit moth is regarded as a most important pest; and the Soviet Union, especially the Black Sea coast, where damage to the harvest by the plum fruit moth may reach 100 percent (Popova 1971). In the United Kingdom, canners often reject larval contaminated fruit (Alford 1978). In Yugoslavia, the first generation of the pest causes economic damage to the earlier varieties of plum, the more highly priced fruits (Batinica and Muratovic 1972). In the Black Sea area of the Caucasus (Soviet Union), the larva was the most important pest of prunes, infesting annually over 60 percent of the fruits, most of which became totally unsuitable for drying (Telenga 1939).

Severe losses of fruit occur in southern Europe. Losses are more sporadic farther north. Severity of outbreaks in the northern part of the range is probably related to a number of factors, but especially to the number of fruit per tree in any year and summer temperatures. Severe infestations are often frequent in warm summers (Kramer 1964). Economic losses are unlikely when average yield per tree is above 10 kg (Batinica 1970).

Hosts

Plum is the main food plant of the pest in West European countries. In Denmark, however, the pest prefers cherry to plum (Popova 1971). The recorded host list includes Prunus spp., Prunus armeniaca (apricot), Prunus avium (sweet cherry), Prunus cerasifera (myrobalan plum), Prunus domestica (plum), Prunus insititia (damson plum, greengage), Prunus japonica (Japanese bush cherry, Japanese plum), Prunus persica (peach), and Prunus spinosa (sloe, blackthorn) (Bradley, Tremewan, and Smith 1979, Popova 1971).

Unusual hosts include Juglans regia (English walnut), Malus sylvestris (apple), Prunus dulcis (almond) (Hill 1983), Prunus cerasus (sour cherry), and Pyrus communis (pear) (Saringer and Deseo 1968).

General
Distribution

Commonwealth Institute of Entomology (1978) listed the following distribution unless otherwise cited: EUROPE - Albania, Austria, Belgium, Bulgaria, Czechoslovakia, Denmark, Finland, France, Germany, Hungary, Italy (including Sicily), Netherlands, southern Norway, Poland, Romania, Spain, southern Sweden, Switzerland, United Kingdom, and Yugoslavia; ASIA - China, Cyprus, Iran, Japan (Bradley, Tremewan, and Smith 1979), Syria, and Turkey; southern Soviet Union; and AFRICA - northern Algeria.



Cydia funebrana distribution map prepared by Non-Regional Administrative Operations Office and Biological Assessment Support Staff, PPQ, APHIS, USDA

Characters

ADULTS (Fig. 1) - Average wingspan 12-15 mm (Alford 1981). Labial palpus, frons grayish fuscous. Forewing mainly overlaid with fuscous brown except obscure pairs of white interspaces between poorly defined blackish-brown costal strigulae; fasciate marking blackish brown, indeterminate except outer edge of sub-basal fascia weak dorsally; discocellular spot minute, indistinct, white; distal area, especially ocellus, irrorate (tips of scales) with white or grayish white, similar irroration mediodorsally forms indistinct blotch; ocellus comprising usually four black dots, edged laterally by thick plumbeous stria on inner margin, thinner stria on outer margin; cilia concolorous with wing basally, otherwise gray, with black sub-basal line indented subapically. Hindwing fuscous, lighter basally and along termen; cilia grayish white, fuscous sub-basal line (Bradley, Tremewan, and Smith 1979).

Fig. 1)



A



B

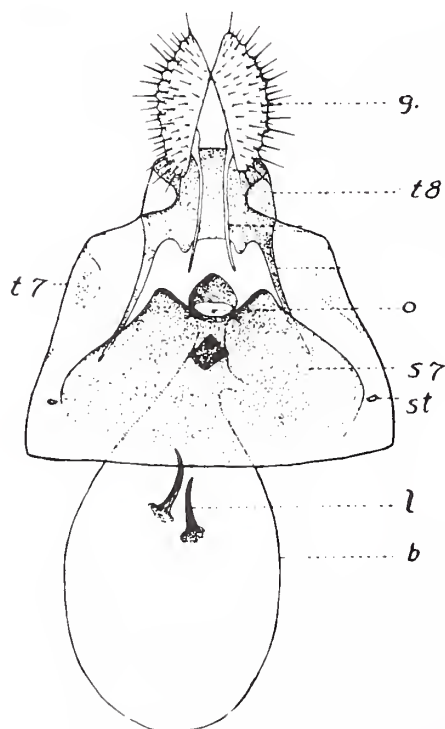
Cydia funebrana adults, dorsal view: A. Male. B. Female (From Bradley, Tremewan, and Smith 1979).

Individuals vary in the clarity of the white interspaces on the costa and in the strength of the whitish irroration in the distal and mediodorsal areas of the forewing (Bradley, Tremewan, and Smith 1979).

Distinguished from C. tenebrosana (Duponchel) (a tortricid moth) by darker grayish fuscous labial palpi and frons, and whitish irroration in distal and mediodorsal areas of forewing in C. funebrana (Bradley, Tremewan, and Smith 1979).

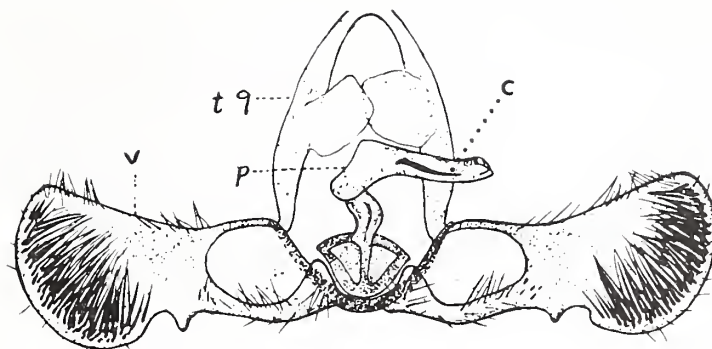
Female genitalia (Fig. 2) of C. funebrana. Male genitalia of C. funebrana (Fig. 3) distinguished from C. tenebrosana by symmetrical projection on sacculus, and peglike projection at orifice of aedeagus. C. tenebrosana, the projection on the sacculus asymmetrical and directed towards the valva, and the aedeagus geniculate (Alford 1978).

(Fig. 2)



Cydia funebrana female genitalia, dorsal view: g - papillae anales; t8 - tergite of 8th abdominal segment t7, s7 - tergite and sternite of 7th abdominal segment; o - ostium bursae; b - corpus bursae; st - spiracle; l laminae dentate (From Bovey 1937).

(Fig. 3)

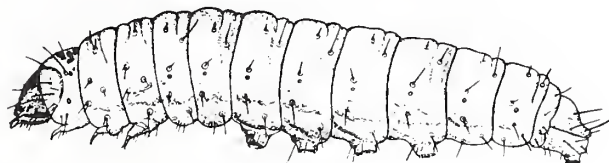


Cydia funebrana male genitalia, dorsal view: v - valva; p - aedeagus; t9 - tegumen; c - cornutus (From Bovey 1937).

EGGS - About 0.7 mm across (Alford 1981). Lenticular-ovate; translucent white, later becoming yellow (Bradley, Tremewan, and Smith 1979).

LARVAE - (Fig. 4). Length of full-grown larva 10-12 mm (Saringer and Deseo 1968). Head dark brown to black; prothorax pale yellow, prothoracic plate pale brown with posterior margin mottled darker brown; thoracic legs pale yellow; abdomen translucent white, becoming pink dorsally and yellowish ventrally as full-grown larva; pinacula light brown, inconspicuous; peritreme brown, inconspicuous; anal plate pale brown with small blackish spots, anal comb with 4-7 prongs, 1-3 small additional prongs laterally (Bradley, Tremewan, and Smith 1979).

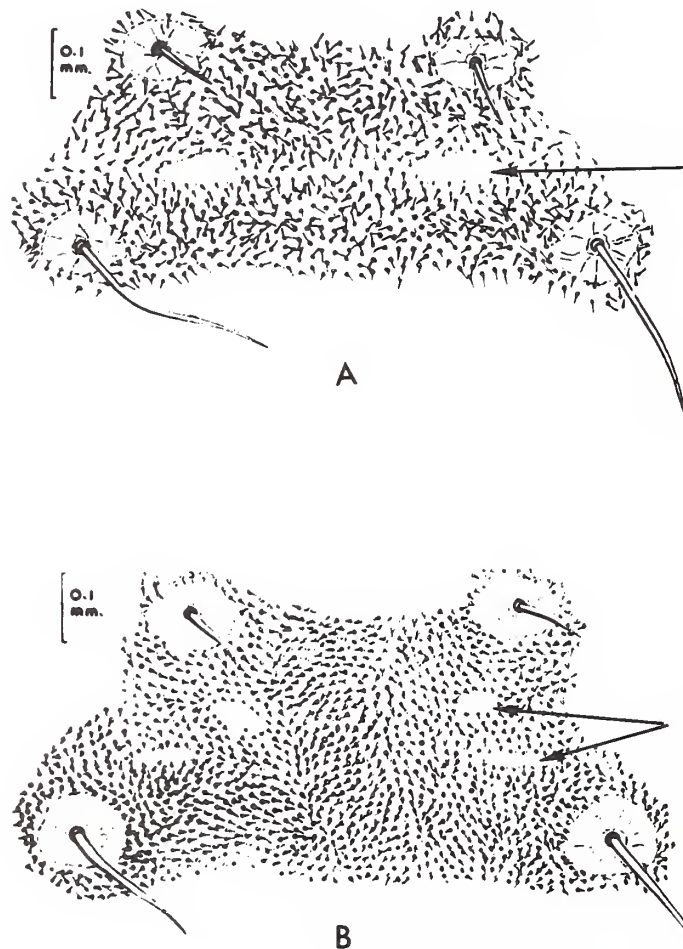
(Fig. 4)



Cydia funebrana larva, lateral view (From Bovey 1937).

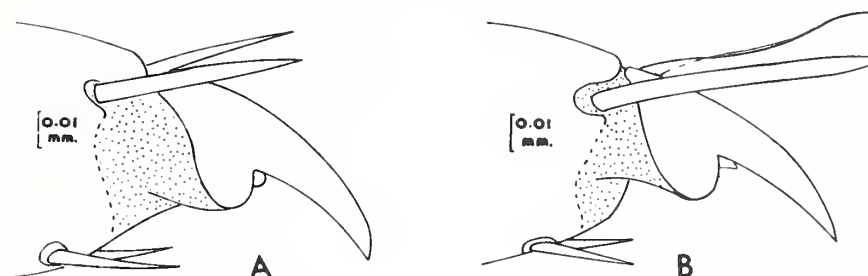
C. funebrana distinguished from C. molesta (Busck) (another tortricid moth) by abdominal segment four dorsum setose with pair of muscle origins (smooth cuticular areas) (Fig. 5A); late instar thoracic legs with setae dorsal to claw tapered and shorter than claw (Fig. 6A). C. molesta, with two pairs of muscle origins (smooth cuticular areas) (Fig. 5B); thoracic legs with dorsal setae flattened, longer than claw (Fig. 6B).

(Fig. 5)



Abdominal segment 4 of last instar larva, showing muscle origins, dorsal view: A. Cydia funebrana. B. C. molesta (From Baker 1963).

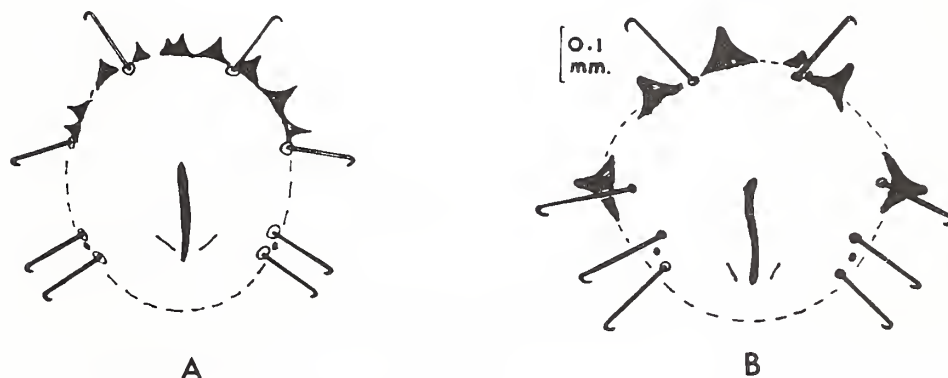
(Fig. 6)



Tarsal segment and claw of prothoracic leg, last larval instar, lateral view: A. Cydia funebrana. B. C. molesta (From Baker 1963).

PUPAE - C. funebrana distinguished from C. molesta by last abdominal segment with dorsal arc of small sharply pointed spines, often weakly developed (Fig. 7A). Length of large spines less than one-fifth distance between dorsal end of anal scar and base of dorsal spines; C. molesta (Fig. 7B) with prominent dorsal arc of rather blunt spines, length of large spines one-third to one-fourth. Number of spines varies in both species (Baker 1963).

(Fig. 7)



Terminal segment of pupa, caudal view: A. Cydia funebrana. B. C. molesta (From Baker 1963).

Characteristic
Damage

The larva bores into the fruit leaving a conspicuous entrance hole surrounded by frass (Fig. 8). The larva moves into the pulp and tunnels around the stone, leaving behind rotting tissues mixed with excrement (Fig. 9) (Bradley, Tremewan, and Smith 1979, U.S. Department of Agriculture 1958). Infested fruits tend to ripen prematurely (Alford 1981).

(Fig. 8)

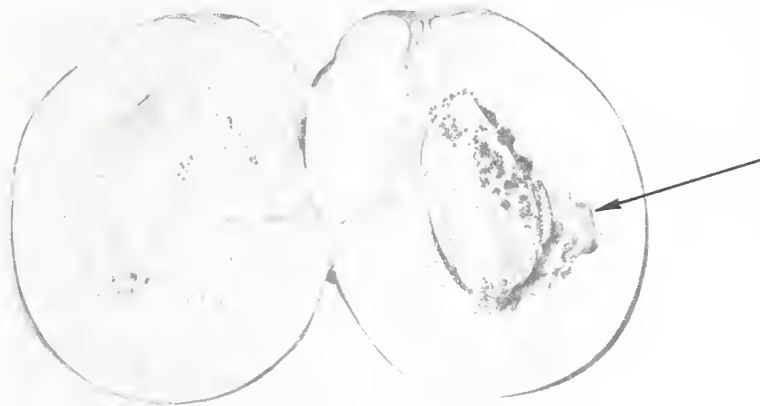


Plum with holes and exudation of frass indicating presence of a larva of Cydia funebrana (From Viggiani and Cancellara 1975).

Detection
Notes

Most of the host fruits are prohibited entry into the United States from various foreign localities where C. funebrana occurs, because of the presence of this pest and/or for other pests and pathogens. Some prohibited hosts include apricot, sweet cherry, plum, peach, and sour cherry. Apples and pears are permitted entry from some of the localities where this pest occurs with treatment for fruit flies, if needed. In those cases the hosts are subject to inspection. The movement of its hosts, fresh fruits, into the United States is regulated under Title 7, Part 319.56 of the Code of Federal Regulations.

(Fig. 9)



Plum showing a larva of C. funebrana feeding internally (From Bradley, Tremewan, and Smith 1979).

Plant Protection and Quarantine has intercepted larvae of Cydia funebrana 8 times at U.S. ports of entry in the past 13 years. There were 7 interceptions from baggage and 1 from stores. It was also intercepted 3 times in Prunus sp. from Yugoslavia and West Germany.

This species is most active at 18-22° C. It may be detected in the following ways.

1. Inspect for eggs at the base of fruit stalks, on fruit surfaces, or on the undersurface of leaves.
2. Watch for holes at the base of the fruit near the stalks and for fruits with exudation of frass.
3. Cut fruit to expose the larva tunneling in the pulp nearer to the seed than to the sides of the fruit (Bradley, Tremewan, and Smith 1979).
4. Inspect for cocoons in crevices in the bark of trees, on main branches, on root collars, or even in fruit containers.

Biology

In the United Kingdom, the adults occur from early summer onwards. Rarely seen by day, the adults apparently rest high in the trees and become active after dusk. Females deposit eggs singly during the summer on the fruit surface with 75 percent at the base of fruit stalks. Up to 9 eggs are laid per fruit, although two larvae rarely survive to maturity in one fruit. Larvae hatch in about 10-14 days. In the fall on plum, the young larva soon makes a hole at the base of the fruit near the stalk and burrows into the fruit to feed on the flesh. The full-grown larva leaves the fruit and spins a silken cocoon in which it overwinters. Larvae form cocoons in almost any convenient situation such as dead wood, a crevice in the bark of a tree, under moss, or in the soil. Pupation usually occurs in the spring. In the United Kingdom, there is one generation a year with sometimes a partial second in late summer or fall, whereas in Krasnodar (Soviet Union), three generations a year occur (Alford 1981, Bradley, Tremewan, and Smith 1979, Popova 1971, Vernon 1971).

On the Black Sea coast in Krasnodar (Soviet Union) within 2-3 days, or less frequently, 4-5 days of emergence, females of the overwintered generation begin to lay eggs singly, sometimes in twos and very occasionally in threes, on the sunlit parts of fruits and on the undersurface of well-lighted leaves. Females of the summer generations lay their eggs only on fruits. Temperatures of 24-26° C favor egg laying. In Romania, the first generation female lays 20-85 eggs, and the second generation female lays 100-200 eggs in a lifetime.

After 3-6 days in Krasnodar, the larvae hatch and bore into the fruit. They deposit the gnawed-away portions of the skin around the hole, bind them together with silk, and seal the entry. Larvae complete development within the fruit in 15-17 days in the coastal area. The last instar larvae leave the fruit to pupate. They overwinter in compact spun casings buried deep in cracks in the bark, under raised bark on trunks, on the main branches, or on the root collar of the tree. The choice of overwintering sites by the larva is determined by cultivation conditions in the orchard and the age of the food plants. The pupal stage lasts about 2-3 weeks on the Black Sea coast.

The adults live 11-16 days. Most C. funebrana are active at 18-22° C. There are three generations on the coast. In the other parts of its range in the Soviet Union and in western Europe, the pest has two generations on plum. The species has a single generation in the central black earth zone, in the Maritime Territory (Soviet Union) and in Sweden on cherry (Popova 1971).

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